

# REPORT ON THE WORK OF THE GREEK ANTIMALARIA LEAGUE DURING THE YEAR 1907

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## I

Greece takes rank among those countries which are the most infested by malaria.

This plague existed here even in the remotest periods of antiquity, and Hippocrates, the father of medicine, not only mentions in his works all the various forms of the disease, but he also was aware of its connection with marshes, and of the influence of certain meteorological conditions, especially the frequency of rain, upon its development.

We know that malaria has always existed in Greece since that time, and Professor Ross is certainly correct in attributing to a great extent the cause of her misfortunes, to this dreadful scourge.

Official statistical information, concerning this disease, exists only for the last nine years, and is limited to the 12 largest towns of Greece, with a population of over 10,000 inhabitants each, or a total of 446,743 souls.

According to these statistics (Table A) it is shewn that the average annual number of deaths from malaria, in the 12 towns referred to, is 287 or 9·8 per 10,000 inhabitants.

The first place, as regards the number of deaths, is held by Volo, in Thessaly (21·89 per 10,000); next in order follow Pyrgos, in the Peloponnesus (19·48), Larissa (17) and Triccala, in Thessaly, (14·72) and Calamata, in the Peloponnesus (13·38).

It must, however, be observed, that these figures do not give an exact idea of the prevalence of malaria throughout the country, as

this disease is much less frequent in the towns than in the rural districts.

That this is the case is clearly shewn by the information which has been collected by the League, and in the publications of many physicians. In fact malaria is so widely spread in our country that scarcely any communities are free from the disease.

The plains of Thessaly, Phthiotis, Acarnania, Boeotia, Elis, Messenia, Argos and Laconia are all severely scourged by this plague, and, at certain periods, hardly a single inhabitant of those districts escapes the disease.

For instance, an examination of the school children, held at Marathon in October, 1906, shewed that enlargement of the spleen was to be found in every pupil (100 per cent.).

The disease usually begins in the month of May, reaches its height in July and August, and commences disappearing in November, but in the more elevated districts it appears later and disappears earlier. However, even in winter relapses are very frequent.

Further statistical information may be found in a small work, published by Professor C. Savas (*Le paludisme en Grèce et l'œuvre de la Ligue Antimalarienne. Atti della Società per gli Studi della malaria, tome VIII, p. 139, 1907*).

## II

The year 1907 was signalised by a severe epidemic of malaria in Greece, as was shewn by the private information which reached the League from all parts of the country, as well as by official statistics (Table A).

As regards, however, the number of cases of the disease, the year 1907 fell short of 1905, whilst the intervening year, 1906, was characterized by a considerable decline in this respect.

In 1907 the greatest number of deaths from malaria took place in July (Table B), August shewing the second highest results, but whilst in the previous years June and September shewed the highest figures, on the contrary, in the year under review a slight decrease in the mortality from the disease was observable in September, followed immediately by a fresh increase in October, which was maintained throughout November. This curious fact, which was observed for

the first time during this year, is to be attributed to the prevailing atmospheric conditions, as, after a warm summer, lasting until the middle of August, the temperature fell in September, after which it again commenced to rise and remained relatively high during October and November.

Consequently, the disease, which had commenced to abate in September, began to re-assert itself in October, and continued in this way throughout November, and even, to a certain extent, in December.

The records, as regards fatal cases of malaria in the year 1907, were held by the Thessalian towns, especially Volo (with 45 deaths per 10,000 inhabitants) followed by Triccala (24) and Larissa (23). The second rank was filled by two Peloponnesian towns; Pyrgos (15 deaths per 10,000), and Calamata (13).

The capital, Athens, itself was severely afflicted by this plague during the year under examination, for, whilst the average annual number of deaths from malaria in that city (as shewn in Table A) is 56, during 1907 no fewer than 71 persons died of the disease, or, in other words, that year was second only to the year 1901 in respect of the number of fatal cases of malaria.

The cause of this prevalence was found to be in the stagnant pools remaining in the river-bed of the Ilissus. The draining of the Ilissus was commenced some three years ago, and those quarters of the city, bordering on the drained portion of the river-bed, were found to have been but slightly affected by the disease this year, whilst the portion of the city adjoining the section of the river where the draining operations had not yet been completed, were severely attacked.

### III

One of the chief cares of the Antimalarian League, after its establishment three years ago, was the collection of information concerning the propagation of malaria.

In view of the fact that the official health statistics are confined entirely to the publication of the number of deaths from various diseases in the 12 largest towns of the kingdom, the League endeavoured to supply this deficiency as far as possible, and with this object a printed circular was addressed to all the physicians with the

request that they would fill in their answers to the questions therein asked. This was also done in 1907. At the same time a bulky volume was issued, containing all the material accumulated by the League during the years 1905 and 1906 (together with the information gleaned by the Panhellenic Congress of 1901) consisting of the reports of 450 physicians on malaria in three hundred demes of the country.

It is hoped that the Statistics of the remaining 120 demes will soon reach us (as we are quite without information as to the progress of the disease in these demes), and the malaria chart of the Kingdom will thus be completed.

This volume in addition contains the transactions of the League during the two years 1905, 1906, together with a number of scientific articles, and was issued in an edition of 3,000 copies and distributed gratis to all the physicians of the Kingdom, so as to serve as an incentive to their aid in the common struggle against malaria.

We also sent 200 copies to the medical men of Crete, accompanied by a circular requesting information respecting the disease in their island during the year 1907.

The High Commissioner of Crete, Mr. A. Zaïmis, was pleased to evince the greatest interest in the suppression of malaria, which infests that island, and he gave the necessary instructions for the commencement of a methodical campaign against the disease.

The Councillor of the Interior also promised to do all in his power to assist in the campaign in view of the progress which has already been made in Greece.

Before proceeding to more important work, the League considered it better to obtain the advice of some of the more eminent provincial medical men, who are actually engaged in the field of battle, and who would be able, by their experience and valuable advice, to afford us considerable assistance.

The summoning of these physicians to Athens would be another considerable advantage to the League in its work, as they would be thus enabled to come into closer contact with us, even on a short visit only, and would be able to discuss the newest ideas, in connection with the propagation and suppression of malaria, and, on their return to their own districts, they would be able to act as apostles of the League and to endeavour to instil the principles of the League by

means of lectures, &c., and in other ways to further the aims of the League.

Inspired by these ideas, the Committee decided to invite to Athens, at the expense of the League, a number of these medical men, and, on the 3rd and 23rd of May O.S. two medical meetings were held and were attended by about 50 physicians from the different provinces of the Kingdom.

Each meeting lasted only two days, and the best means of combating the malarial disease was discussed. With the aid of the lantern and the microscope, in the Laboratories of the Hygienic and Pathologic Anatomical Institute, the malaria parasites and the various kinds of mosquitoes were shewn upon the screen, whilst the causes of malaria and the means of protection against the disease were explained at length in accordance with the most up-to-date theories. Visits were further paid to the bed of the Ilissus river and the breeding places of the Anophelines in the stagnant water.

We consider that the assembly of these doctors at Athens met with complete success, and that it will conduce to the dissemination of the work of the League, as they have already formed, in their own districts, centres for the inculcation of the ideas of the League among the other local medical men.

It gives us great pleasure to mention that only three of the doctors attending the Congress asked for, and received, their travelling and hotel expenses.

The President has received letters from some of these gentlemen, shewing that they are indeed making great efforts to realise the aims of the League, as they have both delivered lectures and have approached the local municipal Councils with proposals for the voting of funds, besides collecting money themselves for the purpose of draining the pools in the neighbourhood of the various communities.

The action of the Board was not limited to the convocation of the physicians, but, actuated by the desire to place the information concerning the means of combating the disease before as wide a circle as possible, so that the people might be furnished with the most up-to-date ideas, the League printed and distributed gratis 30,000 copies of a pamphlet containing information regarding the propagation of malaria and instruction as to the means of prevention.

In addition, the General Secretary of the League, Dr. J.

Cardamatis, was dispatched to 30 towns of the Kingdom in order to deliver lectures on the same subjects, which were attended by a large number of people, including the medical men and local authorities.

By means of these lectures, together with the distribution of printed instructions, and the indication of the anopheline mosquitoes, the interest of all was aroused with regard to this vital question.

The expenditure incurred in connection with the meetings and the lecturing tour of the General Secretary, amounted to Drs. 1.917.55 (about £70). The most important work undertaken by the League in the year 1907, was to combat malaria at Marathon.

The League considered that lectures and publications, and similar measures were not sufficient to achieve its eminently practical aims, but that practical application of the measures recommended by the League was also necessary for the persuasion of the public as to the efficacy of the remedies recommended, whilst, on the other hand, a precedent should be established for the execution of similar works in the future.

This advice had also been given by the Liverpool School of Tropical Medicine in its most valuable report on the suggested anti-malarial measures in Greece, dated the 25th of January, 1907.

The League, however, had other reasons for considering this work to be necessary, as we ourselves should study, in practice, the conditions under which the combating of malaria in Greece was possible, taking into consideration the social and local peculiarities of the country. With this object the Committee selected Marathon as the field of action of the League.

In this respect Marathon presents many advantages, as it is, in the first place, one of the districts which suffers most from malaria; secondly, the plain of Marathon is separated from the surrounding districts by a range of hills, so that it forms a completely independent region; and finally, it lies at a convenient distance from Athens, so that the work could be carried on under the perpetual surveyance of the League. The sole disadvantage connected with the choice of that district lay in the fact that the number of inhabitants is rather large for the purpose (1,680 souls) and is scattered throughout the plain, thus rendering the expenses rather heavier than would otherwise be the case.

The work was commenced on April the 27th, by the establishment

in the village of a permanent Ambulance consisting of one doctor with a medical student as assistant, whilst the General Secretary of the League remained there alternately with the assistant of the Bacteriological Laboratory at the University, so that the Staff always consisted of three members, under the general direction of Professor Savas and Dr. Cardamatis.

The plain of Marathon lies at a distance of 36 kilometres from Athens, and contains three villages, Marathon, the capital of the deme, with 1,200 inhabitants, Bey, with 150, and Souli, with 160 inhabitants. There are, in addition to these villages, several small hamlets scattered here and there in the plain, inhabited by 173 souls in all, giving a total population of the plain of 1,680.

According to the statements of the local doctors, the number of cases of malaria averages between 80 per cent. and 90 per cent. of the population. Dr. Papsotirios examined, during the month of October, 1906, the spleen of all the pupils of both the schools, and found them enlarged in the case of 100 per cent.

Besides this, of 1,216 individuals, whom we examined in the month of May O.S., 1,031 or 85 per cent. admitted that they had suffered from marsh fever during the previous summer. This large number of cases of malaria is chiefly due to the neighbouring river-bed, the waters of which decrease in volume in the summer months, and leave pools full of larvae of *Anopheles superpictus*.

The peasants are also inoculated with the disease during the night, when sleeping in their vineyards, which are situated in the plain, close to several pools and two large marshes, in which breeding-places of Anophelines were always discovered, and especially *Anopheles claviger*, *superpictus* and less often *bifurcatus*.

The work was commenced in two ways, first by ridding the waters of the river-bed of the Anophelines, and, secondly, by the regular distribution of quinine to all the inhabitants as a curative and preventive measure.

The waters of the river-bed were concentrated in a narrow channel, in order to assure a rapid flow, and the pools were covered with petroleum once a week.

This work was partly carried out by workmen, but chiefly by the pupils of the schools, who gladly assisted under the leadership of their teacher, and they were thus afforded an opportunity of a practical

lesson as to the manner of communication of the malaria, and the means of safeguarding themselves against the disease.

The second method of prevention consisted in the distribution of quinine. Owing to the difficulty of supervising the inhabitants as regards the use of quinine, consequent on the manner in which they are scattered throughout the plain, and to the insufficiency of the medical staff, we preferred giving out the quinine according to the Koch's system, which in practice was slightly modified, e.g., the drug was distributed on both Saturdays and Sundays, in doses of 1 gramme each day. We must, however, confess that we often met with considerable difficulty in the application of this mode of distribution, as the giving of a comparatively large quantity at once caused much inconvenience to the people, hindering them in their work, or rendering their Sunday's rest burdensome.

During the whole of the six months of our work, we distributed 23 kilogrammes of quinine and 1 kilogramme of euchinine. The euchinine and 5 kilogrammes of sulphate of quinine were presented to us by the Jobst-Zimmer firm, whilst the Italian Government was kind enough to send us 3,100 kilogrammes ( $3 \frac{1}{10}$ ) of the State quinine, prepared in the manner in which it is sold by that Government in Italy.

The latter method of putting up quinine was very much appreciated by the peasants, and the children, especially, readily took the tannate of quinine with chocolate.

Our experience with the euchinine was not so favourable, as it proved to be much less readily taken than the tannate with chocolate, and less efficacious.

The quinine provided by ourselves was the sulphate, and was distributed in wafer covers.

Of the 1,680 inhabitants of Marathon 1,544 underwent the treatment, but we are without information as to the result of the cure as regards many of these people. Of 1,252 persons, however, we possess the necessary information, and of these only 597, or 47.6 per cent., were attacked by the disease.

A more detailed examination of these figures shews that of 67 persons who took quinine for 21 to 24 weeks, none were attacked by malaria. Of 145 who took the drug for 16 to 20 weeks, 36 suffered, or 20.6 per cent. Of 220 who took quinine during 11 to 16 weeks,



103 were attacked, or 48·6 per cent. ; whilst of 820, who took quinine irregularly and for periods from 1 to 10 weeks, 464 were attacked by malaria, or 56·5 per cent.

It should be here noted that in the surrounding villages, as well as in the whole of Attica, the malaria was very severe during the period under review.

The average amount of quinine consumed by each inhabitant, undergoing the preventive and curative treatment, was 15·6 grammes.

With regard to fatal cases of malaria, in the village of Marathon there died during the summer of 1907 one child of one year old, of pernicious spasmodic fever, and one girl of seventeen years of age, of blackwater fever. In the village of Bey, a child, aged 4 years, died of the latter disease. None of these children had undergone our preventive treatment. We have no information as to the number of deaths from malaria in the summer of the year 1906, but in 1905, seven died of that disease in the village of Marathon.

We hope that we shall be able to continue our work at Marathon under better auspices in the coming summer, when we shall have the advantage of the experience hitherto acquired.

The whole expenditure incurred in the six months' work at Marathon, amounted to Drs. 5.715.65 (£210), of which salary and travelling expense of the doctors, rent and sundry expenses connected with the staff, accounted for Drs. 3.548.70. The purchase of quinine, drugs, &c., Drs. 1.897.25, Petroleum and sundries Drs. 239.20.

The amount expended averages Drs. 3.70 per head for the six months, or less than that expended by the Italian Red Cross Society (which in 1901 amounted to fr. 11.25 per head) and the Austrian Government (Kr. 9.50 in 1903 and 1904).

Besides the sum expended at Marathon and the expenses on the two medical Congresses and the lecturing tour, a further amount of Drs. 6.820 (£250) was accounted for by the printing of the above-mentioned Statistics of the League, the detailed instructions regarding the prevention of malaria, and of the under-mentioned appeal on the part of the League.

The funds, which rendered possible the work of the League, were supplied by philanthropy.

The Committee formed in England, on the initiative of Professor Dr. Ross, under the presidency of Sir Alfred Jones, and which H.R.H.

Princess Christian graciously condescended to favour with her patronage, contributed a sum of £740, collected in Egypt and England.

Notwithstanding the fact that the thanks of the League were conveyed at the time by the President to the English Committee, we take this opportunity of again expressing our deep gratitude to all those friends, who, through their subscriptions so largely contributed to the success of the campaign, the chief object of which is to free our country from this age-long scourge, which has during so many centuries been the source of incalculable harm to the Greek nation.

Before concluding this Report, we must add a few words in connection with the Bill concerning quinine, which was drawn up and submitted to the Government two years ago through the instrumentality of the League.

In view of the fact that the quinine offered for sale, in the remoter parts of the Kingdom, is not only often of bad quality, but is also sold at a high price, and is further taken without any method by the peasants (who, owing to the frequency of the attacks of the disease, do not always consult a doctor, but treat themselves), the League drew up and submitted to the Chamber a bill providing for the undertaking of the sale of quinine by the Government.

In order that the Government, the Press, and Public opinion in general should be fully informed on the subject, the League issued and distributed 6,000 copies of an appeal (in March, 1907) in which it exposed the harm done by malaria, and, at the same time pointed out the remedies against the evil, chief amongst which were the draining of the pools and small marshes in the neighbourhood of dwellings and the introduction of a monopoly of quinine.

In this appeal there were published at the same time: (1) a report on the combating of malaria in Greece, sent us at our request by the Liverpool School of Tropical Medicine; (2) the Bill concerning quinine, with the report relating thereto, and, (3) a translation of the Italian laws concerning the combating of malaria.

The Committee of the Chamber, to which the Bill was forwarded, effected certain alterations therein, in conformity with the Italian system of selling quinine, and the amended Bill was passed in its last reading on December 15th of last year, becoming a law of the Kingdom.

According to this law, the Government has the right to procure and to sell any salt of quinine, which may be designated by the Board of Health. The quinine will be ordered through the Ministry of Finance on the basis of tenders (except if it is purchased from a foreign Government) on terms to be arranged on each occasion by the Board of Health. The limit for each order is fixed at two years.

The sale of quinine will be effected through the Chemical Laboratory of the Ministry of Finance, the Public Treasury, the Post and Telegraph Office, the Public School Teachers and by other public Offices, in virtue of a Royal decree.

The State will sell quinine at cost price, and a reasonable profit will be allowed to retailers. In the case of the sulphate and bisulphate of quinine, the law fixes the price per gramme for retail sale at a maximum of 10 lepta. The prices of other salts will be fixed by Royal decree as occasion arises.

This law does not prohibit the free import and sale of quinine, but quinine so imported will be chemically analysed before its entry into the country.

Penalties are appointed for the sale of State or other quinine at a higher price than that fixed, for adulteration of or the sale of adulterated quinine, or for smuggling quinine into the country, as well as for selling the article under weight.

The law further obliges those demes which suffer severely from malaria to enter in their budget an amount sufficient for the purchase of State quinine for the free supply to the indigent.

The above is a succinct account of the action of the League during the past year. As regards the future, the first item in the programme is the resumption of the campaign at Marathon for a series of years, and, subsequently, by the convocation of more doctors at the capital, and by means of lectures in other towns of the Kingdom, to contribute to the dissemination of the latest ideas regarding the prevention of malaria, and, to sum up, by means of suitable action with the Government and the municipalities together with the large landed proprietors and the public in general, to aim at the application of measures for the drainage of the large number of large and small marshes which cover our country.

This difficult work, however, imperatively calls for the co-operation of philanthropy.

TABLE A.—ANNUAL NUMBER OF DEATHS FROM MALARIA IN THE TWELVE CHIEF TOWNS OF GREECE

Towns	1899	1900	1901	1902	1903	1904	1905	1906	1907	Total number of deaths from Malaria	Average per year of Malaria deaths	Population	Rate of deaths from Malaria per 10,000 inhabitants	Yearly average of deaths from all causes	Rate of death from all causes per 1,000 inhabitants	Rate of deaths from Malaria per 100 deaths of all causes
Athens .....	40	59	78	45	56	46	57	51	71	503	56	174,430	3.59	3,582	22.99	1.56
Piræus .....	30	27	24	22	22	14	24	18	13	194	22	74,583	3.33	1,397	21.25	1.57
Patras .....	40	39	39	37	31	19	40	17	31	293	33	37,724	8.72	965	25.52	3.41
Syra .....	0	3	3	0	1	2	1	0	1	11	1	17,809	0.51	600	30.77	0.16
Triccala .....	19	20	28	29	25	21	38	24	42	246	27	18,132	14.72	402	21.14	6.71
Corfu .....	2	26	17	8	2	7	4	5	2	73	8	29,032	2.84	665	23.57	1.20
Volo .....	23	19	10	10	43	47	115	47	96	410	46	23,563	21.89	490	23.27	9.36
Larissa .....	27	22	23	12	32	35	41	29	41	262	28	18,014	16.99	372	21.79	7.52
Zante .....	11	26	34	15	9	10	7	4	3	119	13	13,580	9.20	326	23.08	3.98
Calamata .....	15	16	14	14	16	34	51	12	21	193	21	15,397	13.38	336	21.40	6.25
Pyrgos .....	19	36	28	29	33	24	22	19	21	231	26	13,600	19.48	353	27.19	7.36
Tripolis .....	6	10	2	5	10	3	2	2	8	48	5	10,789	4.67	238	21.38	2.10
Total .....	232	303	300	226	280	262	402	228	350	2,583	286	446,743	9.80	9,726	23.61	4.33

TABLE B. — NUMBER OF DEATHS IN EACH MONTH DURING THE YEAR 1907

Towns	Jan.	Feb.	Mar.	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Total
Athens .....	2	3	2	2	4	5	13	12	8	8	9	3	71
Piræus .....	0	1	0	0	0	2	2	4	0	1	2	1	13
Patras .....	3	1	1	0	0	2	8	4	2	5	4	1	31
Syra .....	0	0	0	0	0	0	0	0	0	1	0	0	1
Triccala .....	0	0	1	0	0	2	5	8	6	8	10	2	42
Corfu .....	0	0	0	0	0	0	0	1	0	1	0	0	2
Volo .....	1	1	2	3	2	14	23	14	9	8	11	8	96
Larissa .....	1	1	1	0	0	6	3	6	7	11	3	2	41
Zante .....	1	0	0	0	0	0	2	0	0	0	0	0	3
Calamata .....	0	0	0	0	1	6	5	3	3	1	1	1	21
Pyrgos .....	0	2	1	1	1	3	3	2	2	2	3	1	21
Tripolis .....	0	0	0	0	0	0	0	1	2	2	0	3	8
Total .....	8	9	8	6	8	40	64	55	39	48	43	22	350